

CALIFORNIA DEPARTMENT OF PESTICIDE REGULATION

PUBLIC REPORT 2003-7

Polyoxin-D

Tracking ID Numbers 194820-N

DESCRIPTION OF ACTION

Arvesta Corporation submitted an application seeking California registration of Endorse™ Wettable Powder Turf Fungicide to control *Rhizoctonia* infections in turf. This product contains the new active ingredient polyoxin-d. Endorse™ Wettable Powder Turf Fungicide is currently registered with the United States Environmental Protection Agency (U.S. EPA), EPA Reg. No. 68173-2-66330.

The Department of Pesticide Regulation (DPR) evaluated the product label and scientific data supporting registration of this product and found it to be acceptable to support a conditional registration. The acute health risks from exposure to polyoxin-d are minimal due, in part to its low mammalian toxicity. Precautionary and first aid statements on the product label adequately mitigate potential health risks to persons who may come in contact with the pesticide. DPR does not expect any significant adverse environmental impacts to result from registration of this product.

BACKGROUND

Registrant:	Arvesta Corporation
Common name:	Polyoxin-D
Chemical name:	Zinc 5-[[2-amino-5-0-(aminocarbonyl)-2-deoxy-L-xylonoyl]amino]-1-(5-carboxy-3,4-dihydro-2,4-dioxo-1(2H)-pyrimidinyl)-1,5-dideoxy-B-D-allofuranuronate
Brand name:	Endorse™ Wettable Powder Turf Fungicide
Uses:	To control diseases in turf
Pests controlled:	Brown Patch and Large Patch in turf caused by the fungus <i>Rhizoctonia</i>
Type of registration:	Conditional for one year

Endorse™ Wettable Powder Turf Fungicide is a systemic foliar fungicide registered for the control of *Rhizoctonia* diseases in turf located on golf courses, home lawns, parks and commercial and institutional grounds. It is formulated as a wettable powder in a water soluble packet with 2.5% polyoxin-d zinc salt. Polyoxin-d was designated as a biochemical fungicide by U.S. EPA's Biopesticide Division. Polyoxin-d suppresses the synthesis of chitin which prevents the elongation of growing mycelia. This causes new cell walls to rupture, which prevents further growth of the fungus. This compound is very water-soluble and is formulated as a zinc salt to allow it to persist longer on the plant. Once applied, it is readily absorbed by the plant, and translocated to the action site. It can be applied as a preventative or curative treatment in conjunction with good turf management practices. The use directions on the label permit repeated applications of 4 ounces of product per 1,000 square feet (0.006 pounds active ingredient per 1,000 ft²) in a minimum of 0.5 gallons of water. Repeat treatments at intervals of

7-14 days may be necessary when environmental conditions are conducive for disease development. Because polyoxin-d has a specific mode-of-action, it is advisable to use it in conjunction with other fungicides to prevent the development of resistance. The label does prohibit use on turf being grown for sale or other commercial use as sod, commercial seed production, or research purposes.

SCIENTIFIC REVIEW

A. Chemistry

1. Product Chemistry: DPR evaluated the submitted chemistry studies for technical grade polyoxin-d and summarized the results in the following table.

Table I. Physical and Chemical Properties of Polyoxin-D

Properties	Values
Physical state	Brown powder with musty odor
Density	1.84 g/cm ³ at 27° C
pH	7.2 (1% suspension)
Solubility: 1 g/10mL conc. in water	2470 mg/L at 25° C with 7.0 pH
Melting point	Approx. 190° C (decomposition)
Stability	Stable for a year at 25° C

DPR found the product chemistry data satisfactory to meet the regulatory data requirements to support the registration of this product.

2. Residues in Food and Animal Feed: Endorse™ Wettable Powder Turf Fungicide is not intended for use on food or feed. Therefore, residue data are not required.
3. Environmental Fate: Based on its biological source and chemical structure, polyoxin-d is likely to be biodegradable and unlikely to pose adverse impacts to the environment when used in accordance with label directions. The environmental fate data for this active ingredient was not a major concern for this registration and was not reviewed. The current DPR policy for biochemicals is not to require environmental fate data as specified by the Pesticide Contamination Prevention Act (AB 2021).

B. Toxicology

Arvesta Corporation submitted adequate toxicology studies to conduct a complete toxicological evaluation of Endorse™ Wettable Powder Turf Fungicide. DPR evaluated the submitted data to ascertain the potential for adverse health effects. The acute toxicity parameters for Endorse™ Wettable Powder Turf Fungicide are summarized in the following table.

Table II. Acute Toxicity of Endorse™ Wettable Powder Turf Fungicide

Type of Study	Acute Toxicity Values	Acute Toxicity Category
Acute Oral (rats)	LD ₅₀ >5.0 g/kg	IV
Acute Dermal (rats)	LD ₅₀ >2.0 g/kg	III
Acute inhalation (rats)	LC ₅₀ > 4.93 mg/L	IV
Primary eye irritation (rabbits)	N/A	III
Primary dermal irritation (rabbits)	N/A	IV
Dermal sensitization (guinea pigs)	N/A	Not a dermal sensitizer
Signal word	N/A	CAUTION

N/A- Not applicable.

DPR's evaluation of the acute toxicity studies indicates that Endorse™ Wettable Powder Turf Fungicide is low in mammalian toxicity. The precautionary language on the product label adequately identifies the acute toxicity hazards noted in the studies.

Arvesta Corporation submitted the minimum toxicology studies required by Title 40 Code of Federal Regulations (40 CFR) for a biochemical. DPR found the submitted toxicology studies sufficient to satisfy the data requirements of the Birth Defects Prevention Act (SB 950) for a non-food use pesticide registration. The chromosome effects study observed an increased number of cells with chromosomal aberrations which could be considered a possible adverse health effect. At this time, polyoxin-d has not been prioritized by DPR for risk assessment. DPR prioritizes pesticide active ingredients for risk assessment based on the nature of the potential adverse health effects, number of potential adverse effects, number of species affected, no effect levels (NOELs), potential for human exposure, use patterns and similar factors. Based on these criteria, pesticides with the greatest potential for health problems are placed in high priority, with other chemicals being in moderate or low priority. The purpose of the risk assessment will be to appraise the potential for polyoxin-d to cause adverse health effects in humans if exposed to the pesticide as the result of a legal use. The potential for exposure from eating food crops treated with polyoxin-d will also be evaluated during the risk assessment. Further toxicity information is available in DPR's Summary of Toxicology Data for polyoxin-d, available on DPR public website at: <http://www.cdpr.ca.gov/docs/toxsums/pdfs/5788.pdf>.

C. Health & Safety

An evaluation of the medical management information on the Endorse™ Wettable Powder Turf Fungicide label and the acute toxicity study results indicate that the product label bears all of the required statements and warnings regarding safety to handlers and other persons who may be exposed to the pesticide. The product labels bear an adequate First Aid statement. The product is labeled for non-agricultural uses, and as such, is not subject to the federal Worker Protection Standard (WPS) label requirements.

D. Fish & Wildlife

The registrant submitted fish and wildlife toxicity studies, including studies on rainbow trout, daphnia magna, and mallard ducks. The submitted data are adequate to characterize the toxicity to wildlife and aquatic animals from an environmental exposure. Table III summarizes the results of these studies.

Table III. Summary of Toxicity Studies for Wildlife

Test Animal	Type of Study	Acute Toxicity Value ^a	Relative Toxicity
Rat (M/F)	Single acute oral dose	>5000 mg a.i./kg (LD ₅₀)	Relatively non-toxic
Rainbow trout	Water exposure (96 hrs.)	5.1 mg a.i./l (LC ₅₀)	Moderately toxic
<i>Daphnia magna</i>	Water exposure (48 hrs.)	1.4 mg a.i./l (LC ₅₀)	Moderately toxic
Mallard duck	Single acute oral dose	>2150 mg/kg (LD ₅₀)	Relatively non-toxic
Mallard duck	Feeding study (8 days)	>5000 mg/kg (LC ₅₀)	Relatively non-toxic

Values expressed as: a. LD₅₀= lethal dose that will kill 50% of test population, and b. LC₅₀= lethal environmental concentration that will kill 50% of test population. The test substance used for the studies was technical polyoxin-d.

The data indicate that polyoxin-d is relatively non-toxic to mammals and birds and moderately toxic to fish and freshwater invertebrates. Endorse™ Wettable Powder Turf Fungicide is not expected to pose a threat to wildlife when used in accordance with label directions.

E. Efficacy & Phytotoxicity

Arvesta Corporation submitted studies demonstrating the ability of polyoxin-d to control *Rhizoctonia solani* in turf grasses. Thirteen field trials were conducted in several states including one California site comparing polyoxin-d against the industry standards for controlling *Rhizoctonia solani*. The results demonstrated polyoxin-d provided control of *Rhizoctonia solani* that was equivalent to or superior to the industry standards. However, because California has a range of climatic and soil conditions, additional efficacy data are needed from field trials conducted in various locations in the northern and southern parts of the state.

The Endorse™ Wettable Powder Turf Fungicide label cautions the user that due to its specific mode-of-action, the development of resistant *Rhizoctonia* strains is a potential problem. The label recommends the applicator to use curative fungicides as part of a routine spray program. The details of the recommended resistance management program are vague and need better definition. In addition, data are needed to support the label recommendations for resistance management.

The registrant also submitted studies demonstrating the safety of polyoxin-d when applied to turf grasses. Field trials were conducted on various species of turf in 13 states and Canada to evaluate potential phytotoxicity. Applications were made at rates as high as five times greater than the maximum label rate with no evidence of phytotoxicity.

DPR is proposing a one year conditional registration for Endorse™ Wettable Powder Turf Fungicide. The registrant is required to conduct additional trials to demonstrate the ability of this product to control *Rhizoctonia* under a variety of environmental conditions that occur in California. The resistance management program needs to be defined better and supported with additional data to validate the recommendations.

ALTERNATIVES

Endorse™ Wettable Powder Turf Fungicide is a biochemical-like fungicide that is specific for controlling brown patch and large patch in turf caused by *Rhizoctonia*. The reviewed efficacy data indicates Endorse™ Wettable Powder Turf Fungicide provides equivalent to superior control of these diseases compared to the traditional fungicides. It is a safer alternative to most of the currently registered turf fungicides. However, polyoxin-d does have a specific mode-of-action and there is the potential for development of resistant strains of *Rhizoctonia* from repeated use. Use in conjunction with other turf fungicides is recommended.

CONCLUSION

DPR evaluated the product label and scientific data submitted to support the registration of Endorse™ Wettable Powder Turf Fungicide and found them acceptable to support a conditional registration. The acute health risks to humans from exposure to polyoxin-d are minimal due in part to its low mammalian toxicity. The precautionary and first aid statements on the product label mitigate potential health risks to persons who may be exposed to the pesticide. If a risk assessment is conducted, and DPR determines that exposure to polyoxin-d may result in unacceptable margins of exposure, further restrictions will be placed on the use of polyoxin-d at that time. The submitted data also indicate significant adverse environmental impacts are not expected to occur from the use of Endorse™ Wettable Powder Turf Fungicide. When used in accordance with label directions, this product should be effective for its intended use.

DPR is granting a one-year conditional registration for Endorse™ Wettable Powder Turf Fungicide. The registrant is required to conduct additional trials to demonstrate the ability of this product to control *Rhizoctonia* under a variety of environmental conditions that occur in California. The resistance management program on the label needs to be defined better and validated with additional research.